

## WHAT IS CLAIMED IS:

- 1 1. An apparatus for self-initiated instruction issuing comprising an instruction  
2 queue operable for issuing at least one instruction to an execution unit, said queue  
3 including a plurality of entries, each queue entry having a first portion and a second  
4 portion, said first portion operable for storing a first link data value and said second  
5 portion operable for storing a first data value, and wherein said first data value in a  
6 first queue entry is set in response to a first link data value in a preselected second  
7 queue entry, and wherein at least one instruction is selected for issuing in response to  
8 a predetermined first data value in a corresponding queue entry.
- 1 2. The apparatus of claim 1 further comprising a rename register device coupled  
2 to said queue, said rename register device including a plurality of entries, each entry  
3 having a first portion operable for storing a pointer data value and a second portion  
4 operable for storing a validity data value, wherein each said pointer data value is  
5 associated with a corresponding queue entry, and wherein each said first link data  
6 value is set in response to said pointer data values and said validity data values.
- 1 3. The apparatus of claim 2 wherein each said rename register device entry  
2 includes a third portion operable for receiving a plurality of operand tags, and wherein

3 each said pointer data value is operable for selection in response to a preselected one  
4 of said plurality of operand tags.

1 4. The apparatus of claim 3 wherein each said queue entry includes a third  
2 portion coupled to said rename register device for receiving a first one of said  
3 plurality of operand tags, and a fourth portion coupled to said rename register device  
4 for receiving a second one of said plurality of operand tags, wherein said first and  
5 second operand tags are associated with a dispatching instruction, and wherein said  
6 first operand tag is further associated with said first link data value.

1 5. The apparatus of claim 4 wherein said queue is operable for broadcasting a  
2 preselected first operand tag.

1 6. The apparatus of claim 5 further comprising a storage device operable for  
2 receiving said broadcasting of said first operand tag.

1 7. The apparatus of claim 6 wherein said storage device is coupled to said  
2 rename register device, and wherein each said rename register device entry includes a  
3 fourth portion operable for storing a second data value, said second data value being  
4 operable for setting in response to said broadcast first operand tag.

1 8. The apparatus of claim 7 wherein said first data value is operable for setting in  
2 response to said second data value.

1 9. The apparatus of claim 6 further comprising comparison logic coupled to said  
2 storage device and said queue, said comparison logic operable for receiving said  
3 broadcast tag and each said second operand tag, wherein a corresponding first data  
4 value is operable for setting in response to a match between said broadcast tag and at  
5 least one second operand tag.

1 10. The apparatus of claim 2 wherein each said rename register device entry  
2 includes a includes a fourth portion operable for storing a second data value, said  
3 second data value being operable for setting in response to an issuing instruction.

1 11. The apparatus of claim 10 wherein said first data value is operable for setting  
2 in response to said second data value.

1 12. The apparatus of claim 4 wherein each said queue entry further comprises a  
2 fifth portion operable for storing a second link data value and a sixth portion operable  
3 for storing a second data value, and a seventh portion coupled to said rename register  
4 device for receiving a third one of said plurality of operand tags, said third operand  
5 tag being associated with said dispatching instruction, and wherein said third operand  
6 tag is further associated with said second link data value, and wherein said second  
7 data value in said first queue entry is set in response to a preselected second link data  
8 value in a third queue entry.

1 13. The apparatus of claim 12 wherein each said second link data value is set in  
2 response to said pointer data values and said validity data values.

1 14. A method of self-initiated instruction issuing comprising the steps of:  
2 setting a predetermined data value in a first portion of a preselected first queue  
3 entry in a queue operable for storing a plurality of instructions for issuing to an  
4 execution unit, said queue including a plurality of entries, each entry being associated  
5 with an instruction for issuing, wherein said first queue entry is preselected in  
6 response to a first data value in a second portion of a preselected second queue entry;  
7 and

8 selecting for issuing an instruction associated with said entry containing said  
9 predetermined data value in said first portion in response to said predetermined data  
10 value.

1 15. The method of claim 14 further comprising the step of, if said dispatching  
2 instruction is a one-cycle piped instruction, storing a first queue pointer data value  
3 associated with said dispatching instruction in a first portion of an associated rename  
4 register entry, said rename register including a plurality of entries, wherein said queue  
5 pointer value associates said rename register entry and said preselected queue entry  
6 corresponding to said dispatching instruction, and wherein said second queue entry is  
7 selected in response to a second queue pointer value.

1 16. The method of claim 14 further comprising the step of setting said first data  
2 value in response to a source operand data value of said dispatching instruction.

1 17. The method of claim 15 wherein said step of setting said first data value is  
2 omitted in response to a predetermined data value in said first portion of said rename  
3 register entry.

1 18. The method of claim 14 further comprising the steps of:  
2 if an issuing instruction is not a one-cycle piped instruction, broadcasting a  
3 target operand tag; and  
4 setting said predetermined data value in said first portion of said preselected  
5 first queue entry in response thereto.

1 19. The method of claim 14 wherein said step of setting said predetermined data  
2 value in said first portion is in response to an issuing of an instruction associated with  
3 said second queue entry.

1 20. The method of claim 19 further comprising the step of, after a one-cycle  
2 delay, setting a predetermined data value in a first portion of a rename register entry,  
3 said rename register including a plurality of entries, said rename register entry being  
4 associated with said issuing instruction.

1 21. The method of claim 20 further comprising the step of setting said  
2 predetermined data value in a first portion of a preselected first queue entry in  
3 response to said predetermined data value in said first portion of said rename register  
4 entry.

1 22. The method of claim 18 further comprising the step of, after a one-cycle delay  
2 following said broadcasting step, setting a predetermined data value in a first portion  
3 of a rename register entry, said rename register including a plurality of entries, said  
4 rename register entry being associated with said issuing instruction.

1 23. The method of claim 18 further comprising the step of, for each dispatching  
2 instruction, storing a source operand tag in a third portion of each queue entry, and  
3 wherein said step of setting said predetermined data value in said first portion of said  
4 preselected first queue entry in response to said target operand tag further comprises  
5 the step of comparing said target operand tag and said source operand tag contained in  
6 said third portion of each queue entry, said predetermined data value set in each entry  
7 wherein a match occurs.

1 24. The method of claim 22 further comprising the step of setting said  
2 predetermined data value in said first portion of a preselected first queue entry in

3 response to said predetermined data value in said first portion of said rename register  
4 entry.

1 25. The method of claim 15 wherein said second queue pointer value is associated  
2 with a source operand tag of said dispatching instruction.

1 26. The method of claim 25 wherein said second queue pointer value corresponds  
2 to a queue entry of an instruction target operand tag matching said source operand.

1 27. The method of claim 14 wherein said first data value comprises a link mask  
2 having a number of bits equal to a number of entries in said queue.

1 28. The method of claim 14 wherein said step of setting said predetermined data  
2 value is in response to an issuing of an instruction associated with said second queue  
3 entry.



1 29. A data processing system for self-initiated instruction issuing comprising:  
2 an input means for communicating a plurality of instructions;  
3 a dispatch unit coupled to said input means;  
4 at least one execution unit coupled to said dispatch unit for receiving  
5 instructions communicated therefrom, each execution unit including a self-initiated  
6 instruction issue mechanism for receiving said instructions and issuing instructions to  
7 an execution logic circuit for execution, said self-initiated issue mechanism  
8 comprising:  
9 an instruction queue operable for issuing at least one instruction to said  
10 execution unit, said queue including a plurality of entries, each queue entry having a  
11 first portion and a second portion, said first portion operable for storing a first link  
12 data value and said second portion operable for storing a first data value, and wherein  
13 said first data value in a first queue entry is set in response to a first link data value in  
14 a preselected second queue entry; and  
15 a rename register device coupled to said queue, said rename register device  
16 including a plurality of entries, each entry having a first portion operable for storing a  
17 pointer data value and a second portion operable for storing a validity data value,  
18 wherein each pointer data value is associated with a corresponding queue entry, and  
19 wherein each first link data value is set in response to said pointer data values and  
20 said validity data values.

1 30. The data processing system of claim 29 wherein each said rename register  
2 device entry includes a third portion operable for receiving a plurality of operand tags,  
3 and wherein each said pointer data value is operable for selection in response to a  
4 preselected one of said plurality of operand tags.

1 31. The data processing system of claim 30 wherein said queue is operable for  
2 broadcasting a preselected first operand tag.

1 32. The data processing system of claim 31 further comprising a storage device  
2 operable for receiving said broadcast first operand tag.

1 33. The data processing system of claim 32 wherein said storage device is coupled  
2 to said rename register device, and wherein each said rename register device entry  
3 includes a fourth portion operable for storing a second data value, said second data  
4 value being operable for setting in response to said broadcast first operand tag.

1 34. The data processing system of claim 33 wherein said first data value is  
2 operable for setting in response to said second data value.

1 35. The data processing system of claim 32 further comprising comparison logic  
2 coupled to said storage device and said queue, said comparison logic operable for

3 receiving said broadcast tag and each said second operand tag, wherein a  
4 corresponding first data value is operable for setting in response to a match between  
5 said broadcast tag and at least one second operand tag.

1 36. The data processing system of claim 30 wherein each said rename register  
2 device entry includes a includes a fourth portion operable for storing a second data  
3 value, said second data value being operable for setting in response to an issuing  
4 instruction, and wherein said first data value is operable for setting in response to said  
5 second data value.

1 37. The data processing system of claim 30 wherein each said queue entry further  
2 comprises a fifth portion operable for storing a second link data value and a sixth  
3 portion operable for storing a second data value, and a seventh portion coupled to  
4 said rename register device for receiving a third one of said plurality of operand tags,  
5 said third operand tag being associated with said dispatching instruction, and wherein  
6 said third operand tag is further associated with said second link data value, and  
7 wherein said second data value in said first queue entry is set in response to a  
8 preselected second link data value in a third queue entry.